FOREST PRODUCTS
Project Fact Sheet

FIBER OPTIC SENSOR FOR ON-LINE MEASUREMENT OF PAPER BASIS WEIGHT

BENEFITS

- Improved productivity
- Enhanced product quality
- Reduced processing wastes

APPLICATIONS

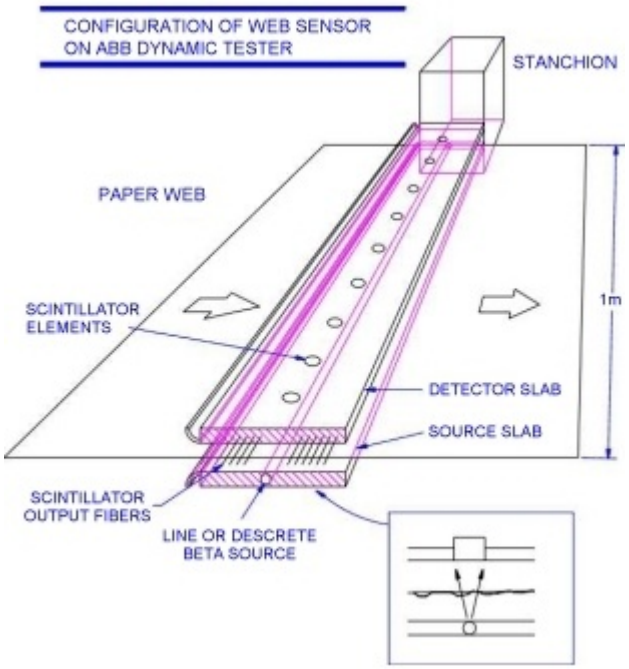
A new web sensor for paper basis weight would be transferred to the U.S. paper industry and other industries with web-based manufacturing processes.

New Concept Will Replace Existing Point-Scanning Instrumentation

This project is another component of the multi-faceted effort to provide the paper industry with technology for real-time monitoring of the entire moving paper web.

The existing technology for paper web sensors uses point-scanning instrumentation for measuring paper basis weight. The proposed technique would employ nuclear instrumentation distributed across the full web width. Beta particles transmitted by the web are detected by an array of stationary fiber optic scintillators and fed to optical detectors off-web. Basis weight measurements can be taken at 1 centimeter across the web over measurement times of 1-10 seconds.

This effort will build on developmental work undertaken previously by the Pacific Northwest National Laboratory and ABB Industrial Systems, Columbus, Ohio.



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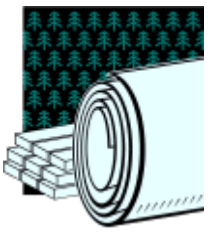
PROJECT DESCRIPTION

Goal: To determine the potential for the accuracy and spatial resolution of paper basis weight measurements with the point-scintillator technology. A multi-point basis weight sensor will be developed and evaluated on the ABB Dynamic Tester (ABBDT), which can run a 1-meter wide paper sheet at production speeds (3,000 to 4,000 feet/minute).

Several technical problems need to be resolved. The instrument must allow rapid and precise realignment/recalibration after the top and bottom halves of the sensor system have been separated for threading the paper web. To perform real-time, on-line measurement of paper basis weight the beta-induced scintillation rate must be very high (100,000 to 1,000,000 counts per second). This high scintillation rate is necessary to attain the required relative standard deviation of about 0.5 percent in basis weight measurements. These high count rates will demand state-of-the-art performance from the nuclear instrumentation and data acquisition systems. Performance parameters that will be examined include scintillator decay lifetime, fiber optic pulse broadening, photomultiplier response time, and pulse pile-up effects.

PROGRESS & MILESTONES

- Design and build a prototype of a multi-point basis weight sensor.
- Test the prototype on the ABBDT, comparing its measurements with those from a standard industry scanner.
- Complete this effort in Fiscal Year 1999.



PROJECT PARTNERS

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